

CLAIMS

I claim:

1. A bulk material loading device, comprising:

(a) an upper casing assembly having inlet means for receiving a bulk material;

5 (b) a motor having a shaft and a motor housing, wherein said motor housing is mounted to said upper casing assembly outside of said inlet means;

(c) an impeller in rotational communication with said shaft of said motor, wherein said impeller is aligned beneath said inlet means; and

(d) a shutter assembly operatively connected between said motor housing and said
10 upper casing assembly, wherein said shutter assembly is movable between a closed position preventing said device from dispersing said bulk material and an open position permitting said device to disperse said bulk material.

2. The device of claim 1, further comprising level sensing means operatively
15 positioned below said impeller for sensing an accumulation of said bulk material.

3. The device of claim 1, wherein said shutter assembly comprises:

(a) a cylindrical shutter having an upper rim and a lower rim; and

(b) a shutter flange extending radially from said shutter.

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4. The device of claim 1, wherein said motor housing includes a shutter contact surface formed to contact said shutter assembly in a closed position and retain residual bulk material inside said device.

5. The device of claim 1, wherein said upper casing assembly further comprises lifting means operatively in contact with said shutter assembly for at least partially opening said shutter assembly to permit the release of residual bulk material from said device.

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6. The device of claim 5, wherein said shutter assembly further comprises a plurality of lifting flanges, and wherein said lifting means comprises a plurality of lifting actuators operatively in contact with said lifting flanges.

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7 The device of claim 6, wherein said lifting actuators are pneumatic.

8. A bulk material loading device, comprising:

(a) an upper casing assembly having inlet means for receiving a bulk material;

(b) a motor having a shaft and a motor housing, wherein said motor housing is

15 mounted to said upper casing assembly outside of said inlet means; and

(c) an impeller in rotational communication with said shaft of said motor, wherein said impeller is aligned beneath said inlet means, wherein said impeller comprises an upper portion and a lower portion, wherein said lower portion includes a plurality vanes adapted to disperse said bulk material, and wherein said upper portion includes a surface formed to direct
20 said bulk material into said plurality of vanes.

9. The device of claim 8, further comprising a shutter assembly operatively connected between said motor housing and said upper casing assembly, wherein said shutter

assembly is movable between a closed position preventing said device from dispersing said bulk material and an open position permitting said device to disperse said bulk material.

10. The device of claim 8, further comprising level sensing means operatively
5 positioned below said impeller for sensing an accumulation of said bulk material.

11. The device of claim 9, wherein said shutter assembly comprises:

- (a) a cylindrical shutter having an upper rim and a lower rim; and
- (b) a shutter flange extending radially from said shutter.

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12. The device of claim 9, wherein said motor housing includes a shutter contact surface formed to contact said shutter assembly in a closed position and retain residual bulk material inside said device.

15 13. The device of claim 9, wherein said upper casing assembly further comprises lifting means operatively in contact with said shutter assembly for at least partially opening said shutter assembly to permit the release of residual bulk material from said device.

20 14. The device of claim 13, wherein said shutter assembly further comprises a plurality of lifting flanges, and wherein said lifting means comprises a plurality of lifting actuators operatively in contact with said lifting flanges.

15. The device of claim 14, wherein said lifting actuators are pneumatic.

16. A bulk material loading device, comprising:

(a) an upper casing assembly having inlet means for receiving a bulk material;

(b) a motor having a shaft and a motor housing, wherein said motor housing is

5 mounted to said upper casing assembly outside of said inlet means; and

(c) an impeller in rotational communication with said shaft of said motor, wherein said impeller is aligned beneath said inlet means, wherein said impeller includes a plurality of vanes, and wherein said vanes are oriented at a predetermined non-zero angle with respect to vertical.

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17. The device of claim 16, further comprising a shutter assembly operatively connected between said motor housing and said upper casing assembly, wherein said shutter assembly is movable between a closed position preventing said device from dispersing said bulk material and an open position permitting said device to disperse said bulk material.

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18. The device of claim 16, further comprising level sensing means operatively positioned below said impeller for sensing an accumulation of said bulk material.

19. The device of claim 17, wherein said shutter assembly comprises:

(a) a cylindrical shutter having an upper rim and a lower rim; and

(b) a shutter flange extending radially from said shutter.

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20. The device of claim 17, wherein said motor housing includes a shutter contact surface formed to contact said shutter assembly in a closed position and retain residual bulk material inside said device.

21. The device of claim 17, wherein said upper casing assembly further comprises lifting means operatively in contact with said shutter assembly for at least partially opening said shutter assembly to permit the release of residual bulk material from said device.

22. The device of claim 21, wherein said shutter assembly further comprises a plurality of lifting flanges, and wherein said lifting means comprises a plurality of lifting actuators operatively in contact with said lifting flanges.

23. The device of claim 22, wherein said lifting actuators are pneumatic.

24. A bulk material loading device, comprising:

- (a) an upper casing assembly having inlet means for receiving a bulk material;
- (b) a motor having a shaft and a motor housing, wherein said motor housing is mounted to said upper casing assembly outside of said inlet means;
- (c) an impeller in rotational communication with said shaft of said motor, wherein said impeller is aligned beneath said inlet means; and
- (d) level sensing means operatively positioned below said impeller for sensing an accumulation of said bulk material in a container when said bulk material in said container is at a predetermined height above an operative level of said level sensing means.

25. The device of claim 24, further comprising a shutter assembly operatively connected between said motor housing and said upper casing assembly, wherein said shutter assembly is movable between a closed position preventing said device from dispersing said bulk material and an open position permitting said device to disperse said bulk material.

26. The device of claim 24, wherein said impeller comprises an upper portion and a lower portion, wherein said lower portion includes a plurality of vanes adapted to disperse said bulk material, and wherein said upper portion includes a surface formed to direct said bulk material into said plurality of vanes.

27. The device of claim 24, wherein said impeller includes a plurality of vanes, and wherein said vanes are oriented at a predetermined non-zero angle with respect to vertical.

28. The device of claim 25, wherein said shutter assembly comprises:

- (a) a cylindrical shutter having an upper rim and a lower rim; and
- (b) a shutter flange extending radially from said shutter.

29. The device of claim 24, wherein said motor housing includes a shutter contact surface formed to contact said shutter assembly in a closed position and retain residual bulk material inside said device.

30. The device of claim 24, wherein said upper casing assembly further comprises lifting means operatively in contact with said shutter assembly for at least partially opening said shutter assembly to permit the release of residual bulk material from said device.

5 31. The device of claim 30, wherein said shutter assembly further comprises a plurality of lifting flanges, and wherein said lifting means comprises a plurality of lifting actuators operatively in contact with said lifting flanges.

32. The device of claim 31, wherein said lifting actuators are pneumatic.

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33. The device of claim 24, wherein said level sensing means comprises a level probe attached adjacent to said motor housing, said level probe being responsive to contact with said bulk material.

15 34. The device of claim 33, wherein said level probe is a piezoelectric-based vibratory probe.

35. The device of claim 33, wherein said level probe is protected within a well having an inlet port and a bottom opening.

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36. The device of claim 33, wherein said level probe is detachably mounted by a set screw.

37. A bulk material loading device, comprising:

(a) an upper casing assembly having inlet means for receiving a bulk material;

(b) a material guide, positioned below said inlet means, having a surface capable of deflecting said bulk material; and

5 (c) level sensing means operatively positioned below said material guide for sensing an accumulation of said bulk material in a container when said bulk material in said container is at a predetermined height above an operative level of said level sensing means.

38. The device of claim 37, wherein said level sensing means comprises a level probe
10 attached below said material guide, said level probe being responsive to contact with said bulk material.

39. The device of claim 38, wherein said level probe is a piezoelectric-based vibratory probe.

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40. The device of claim 38, wherein said level probe is protected within a well having an inlet port and a bottom opening.

41. The device of claim 38, wherein said level probe is detachably mounted by a set
20 screw.